

REMARKS

Applicants have carefully considered the December 23, 2008 Office Action, and the comments that follow are presented in a bona fide effort to address all issues raised in that Action and thereby place this case in condition for allowance.

Claims 1-3 and 5-20 are pending in this application. Claims 17-20 have been withdrawn from consideration pursuant to the provisions of 37 C.F.R. § 1.142(b). Claim 1 has been amended. No new matter has been entered. Support for the amendment can be found in FIG. 5(a), 6(d) and paragraph [0064] of the published version of the present application. The presence of the grain boundaries between each diamond grain is apparent from an AFM microphotograph showing a surface of the diamond coating of the present subject matter. See also the SEM microphotograph of FIG. 6(d) showing the same surface. Paragraph [0064] of the supporting specification describes these micrographs.

Entry of the present response is respectfully solicited. It is believed that this response places this case in condition for allowance. Hence, prompt favorable reconsideration of this case is solicited.

Claims 1-3, 5-8, 14 and 16 were rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Phillips et al. (U.S. Pat. No. 5,571,615, hereinafter "Phillips"). Applicants traverse.

Applicants would stress that the factual determination of lack of novelty under 35 U.S.C. § 102 requires the identical disclosure in a single reference of each element of a claimed invention, such that the identically claimed invention is placed into the recognized possession of one having ordinary skill in the art. *Dayco Prods., Inc. v. Total Containment, Inc.*, 329 F.3d

1358, 66 USPQ2d 1801 (Fed. Cir. 2003); *Crown Operations International Ltd. v. Solutia Inc.*, 289 F.3d 1367, 62 USPQ2d 1917 (Fed. Cir. 2002). There are significant differences between the claimed subject matter and the article disclosed by Phillips that would preclude the factual determination that Phillips identically describes the claimed subject matter within the meaning of 35 U.S.C. § 102.

Claim 1, as presently amended, describes that the diamond coated tool includes diamond grains constituting a growth surface of the diamond coating has an average grain size of about 1.5 micrometers or below, wherein grain boundaries are formed between each of the diamond grains. Thus, claim 1, as amended, clarifies that a diamond coating has a “double crystal structure”.

As previously submitted in Applicants’ response of March 18, 2009, in response to the Examiners comment at page 6, paragraph 6 of the final Office Action, Applicants confirm that the phrase “aggregation of diamond fine grains” and “double crystal structure” pointed by the Examiner mean the same structure. The diamond coating of the present claimed subject matter is formed of diamond grains and each of the diamond grains is further formed of diamond fine grains. In Applicants previous response, the phrase “double crystal structure” was offered to facilitate the Examiner’s understanding of such a structure.

Turning to the Phillips patent, Applicants submit that Phillips merely shows elongated diamond grains that extend from a substrate to a surface of a diamond coating in Figure 4 and Phillips neither teaches nor remotely suggests that these diamond grains are further formed of diamond fine grains. Thus, the structure of the diamond coating of Phillips can be restated

simply as “a single crystal structure.” Accordingly, the Phillips patent fails to identically disclose or suggest every limitation of the present claimed subject matter.

Applicants are in the process of preparing and obtaining a Declaration pursuant to 37 C.F.R. § 1.132 by an inventor of the present application in response to the Examiner’s comment at paragraph 4 of the Advisory Action dated April 3, 2009, which asserted that the previously submitted evidence (reproduced below) amounted to “attorney argument”. The executed Declaration will be submitted promptly for consideration by the Examiner.

The result of Raman spectroscopic analysis most obviously shows a difference between the crystal structure of the diamond coating of the present subject matter and that of Phillips. The result of Raman spectroscopic analysis on the diamond coating of the present subject matter shows a local peak in the vicinity of $1100\sim1150\text{ cm}^{-1}$. See FIGS. 9 and 10 of the present specification. This peak is one of physical values specifying the “double crystal structure.” By contrast, the result of Raman spectroscopic analysis on the diamond coating of Phillips does not show a data in the vicinity of $1100\sim1150\text{ cm}^{-1}$. See FIG. 5 of Phillips. This is probably due to the fact that a distinctive peak does not exist in the vicinity.

The significance of Raman spectroscopic analysis is now explained. Applicants performed a test to demonstrate that a difference of crystal structure is reflected in a result of Raman spectroscopic analysis. Since Phillips does not teach a producing condition in detail, a diamond coating is formed under a condition adjusted so as to obtain a result which is similar to the result shown in FIG. 5 of Phillips. FIG. 1, reproduced below, is a graph showing a result of Raman spectroscopic analysis of a diamond coating obtained in the test. FIG. 2, also reproduced below, is a SEM photograph showing a cross-sectional surface of the same diamond coating.

FIG. 1

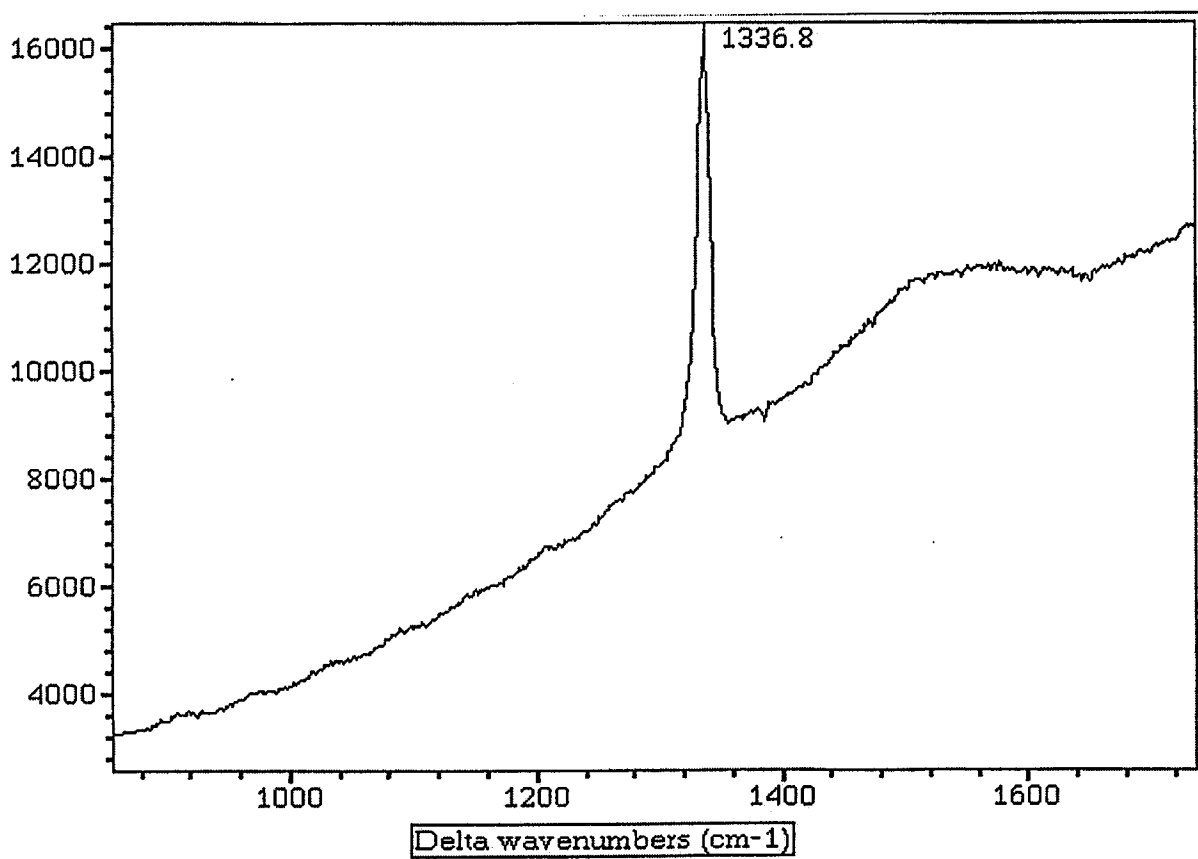
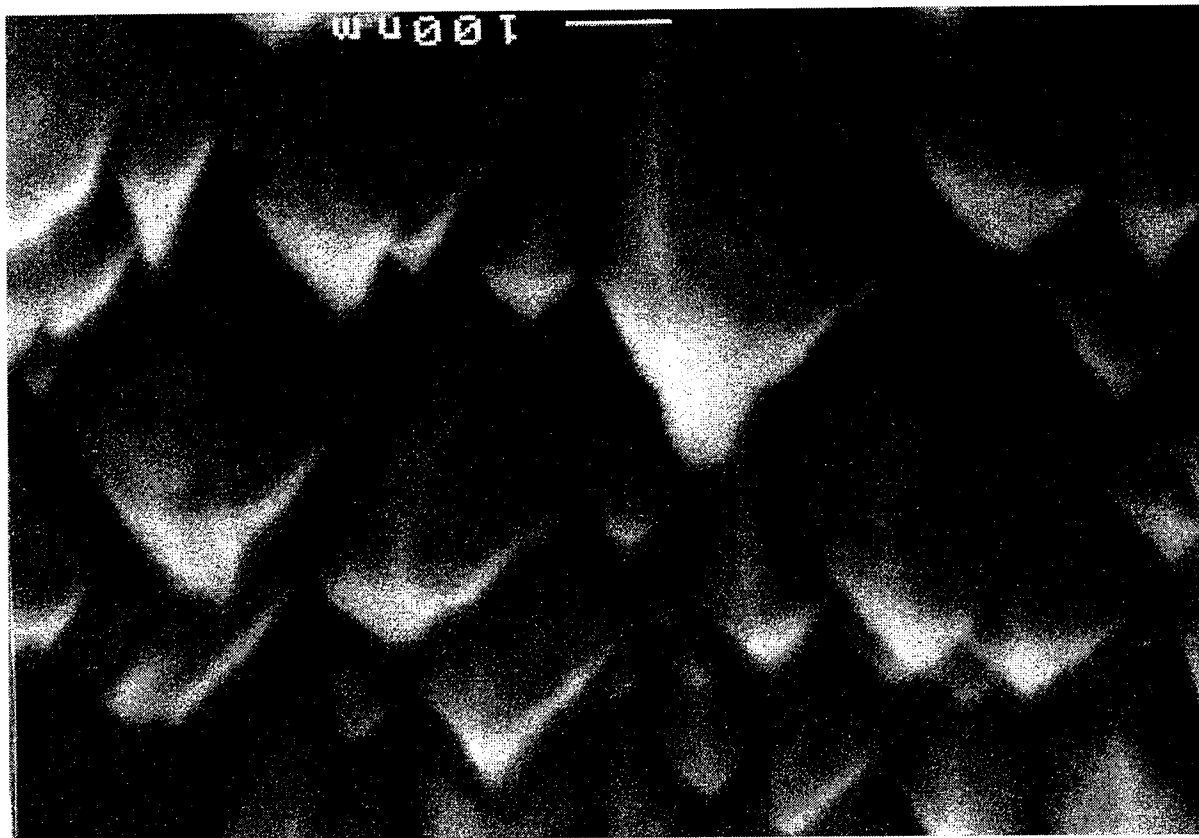


FIG. 2



Referring to FIG. 1 above, while there is a peak in the vicinity of 1330 cm^{-1} , a local peak does not appear in the vicinity of $1100\sim 1150\text{ cm}^{-1}$, unlike FIGS. 9 and 10 of the present application. This experimental result indicates that the diamond coating produced in the test has a crystal structure similar to that described in the Phillips patent.

Turning attention to FIG. 2 above, the SEM photograph has a scale of nanometer order, that is, FIG. 2 shows an enlarged equivalent of diamond grains of the diamond coating shown in FIG. 4 (micrometer order) of Phillips.

Moreover, FIG. 2 (above) has the same scale as FIG. 7 of the present application (a SEM photograph showing diamond fine grains of the present subject matter). Therefore, by

observing FIG. 2 (above) and FIG. 7 of the present application, a comparison of the crystal structure can be made between the diamond coating of Phillips and that of the present claimed subject matter. In fact, the differences are readily apparent when these two figures are compared. More importantly, it is clear that the diamond coatings of Phillips and the present application are totally different in terms of their crystal structure.

Phillips discloses a carbide substrate coated with a diamond film and the diamond film has a thickness of greater than about 10 microns and a grain size of less than about 0.5 microns. The diamond film of Phillips merely has a single crystal structure which is totally distinct from the claimed “aggregation of diamond fine grains” (“double crystal structure”).

Furthermore, as described in the present application, the surface of the substrate is carburized before it is coated with a diamond coating by a CVD method. The carburization is an indispensable process as indicated by the result of Embodiment 1. In contrast, Phillips only teaches that the diamond film is formed by a CVD method. Phillips does not teach or remotely suggest anything about carburization before coating or conditions such as a pressure of an atmosphere for a diamond coating process. Accordingly, it is hardly possible that the diamond film of Phillips has a diamond coating with diamond grains formed of an aggregation of diamond fine grains (“double crystal structure”) of the present claimed subject matter.

The foregoing factual evidence underscores the dissimilarity between the present claimed crystal structure and that of the applied prior art. Applicants again note that an executed Declaration under 37 C.F.R. § 1.132 will be submitted for the Examiner’s consideration.

The above argued differences between the claimed diamond coated tool and the Phillips’s article undermines the factual determination that Phillips discloses the diamond coated tool

identically corresponding to that claimed. *Minnesota Mining & Manufacturing Co. v. Johnson & Johnson Orthopaedics Inc.*, 976 F.2d 1559, 24 USPQ2d 1321 (Fed. Cir. 1992); *Kloster Speedsteel AB v. Crucible Inc.*, 793 F.2d 1565, 230 U.S.P.Q. 86 (Fed. Cir. 1986). Applicants, therefore, submit that the imposed rejections under 35 U.S.C. § 102 or 103 predicated on Phillips are not factually viable since the Phillips patent fails to disclose or fairly suggest each and every limitation of independent claim 1. Hence, Applicants respectfully request withdrawal of the rejections under 35 U.S.C. § 102 or 103 predicated on Phillips.

Dependent claims 9-13 and 15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Phillips in view of Kembaiyan et al. (U.S. Pat. App. Pub. No. 2004/0060742, hereinafter “Kembaiyan”). Applicants traverse.

Applicants incorporate herein the arguments previously advanced in traversal of the rejection under 35 U.S.C. § 102(b) predicated upon Phillips. The secondary reference to Kembaiyan does not cure the argued deficiencies of Phillips.

Kembaiyan discloses cutters for earth-boring drill bits made from a tungsten carbide and having a diamond layer covering the cutting face. Kembaiyan does not disclose the thickness of the diamond layer or grain size of diamond grains constituting the diamond layer. It is assumed that the diamond layer is formed thick as the invention of Kembaiyan is related to the earth-boring drill bits (as shown in Figure 1 and paragraph [0005]).

It can be hardly said that a base rock subjected to cutting would require excellent work surface roughness as in the field of micro processing to which the present subject matter is related. Accordingly, it can be considered that the diamond layer disclosed in Kembaiyan has neither a surface as smooth as it is defined in the claim 1 of the present application, nor a “double

crystal structure” to achieve a smooth surface. Thus, even if the applied references are combined as suggested by the Examiner, the claimed subject matter will not result. *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988).

It is believed that pending claims 1-3 and 5-16 are now in condition for allowance. Applicants therefore respectfully request an early and favorable reconsideration and allowance of this application. If there are any outstanding issues which might be resolved by an interview or an Examiner’s amendment, the Examiner is invited to call Applicants’ representative at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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